

Title : Frabication of Electrospun Nanofiber film of Polyaniline and Poly(3-aminobenzoic acid) Copolymer for detection of targeted biomolecule

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ABSTRACT

The development of conductive polymers for biosensor applications has attracted significant interest, as these materials offer adjustable properties and high specificity in detecting target biomolecules. This research focuses on the fabrication of electrospun nanofiber film composed of polyaniline (PANI) and poly(3-aminobenzoic acid) (PABA) using the electrospinning technique. The PANi/PABA copolymer was firstly synthesized through chemical polymerization at a 1:1 ratio. The PANi/PABA copolymer was subsequently processed into nanofiber film using the electrospinning technique under controlled parameters, including an applied voltage of 10 kV, a solution flow rate of 1.0 mL/h, a total volume of 5 mL, a processing duration of 10 minutes, and a needle-to-collector distance of 10 cm. The morphological analysis revealed that the PANi/PABA nanofiber film exhibited a fibrous structure with an average fiber diameter of 135.56 nanometers. Fourier-transform infrared spectroscopy with attenuated total reflectance (ATR-FTIR) confirmed the presence of key functional groups, including O-H, N-H, C=O, and C=C, indicating the effective integration of the two polymers. Furthermore, electrochemical characterization using cyclic voltammetry (CV) demonstrated distinct redox behavior in phosphate-buffered saline (PBS), with anodic and cathodic currents increasing as the scan rate increased. These results suggest that the PANi/PABA nanofiber films exhibit favorable electrical properties, making them suitable for electrochemical sensing applications. To evaluate the biomolecular sensing capability, differential pulse voltammetry (DPV) was employed. The results indicated that the PANi/PABA nanofiber films exhibited high sensitivity and specificity for biomolecule detection. This study highlights the potential of the developed PANi/PABA copolymer as a promising material for high-performance biosensor applications.

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